

Final Review Multiple Choice Problems #5

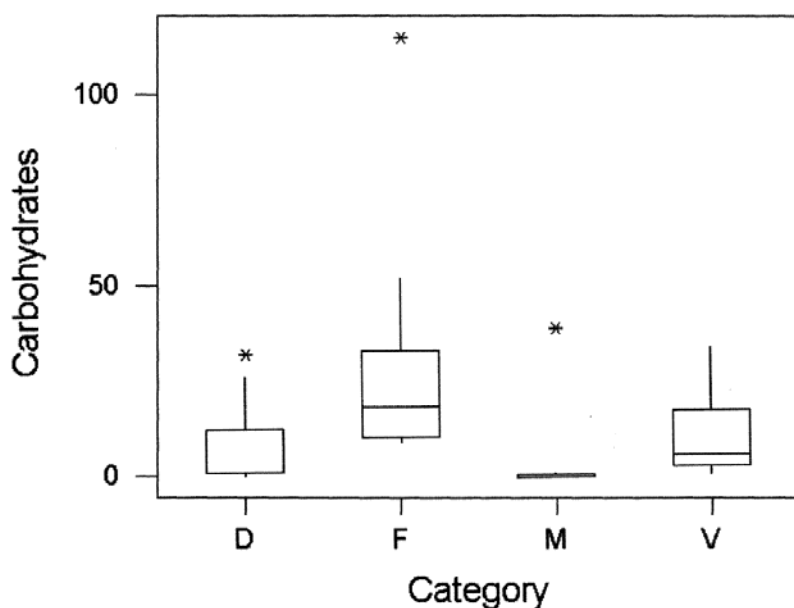
21. Pearson High School students have cumulative grade point averages as shown in the table.

Class \ GPA	≥ 4.0	3.0–4.0	2.0–3.0	1.0–2.0	< 1.0	Total
Sophomores	43	121	114	22	10	310
Juniors	26	102	84	16	5	233
Seniors	15	87	100	10	7	219
Total	84	310	298	48	22	762

Which of the following statements is *not* true?

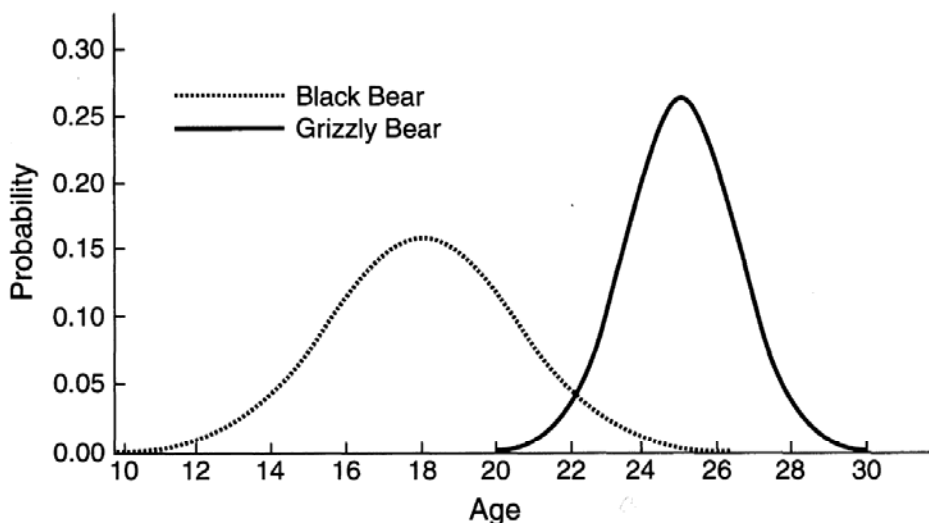
- (A) About 39% of sophomores have *at least* a 3.0 GPA.
 - (B) Sophomores represent 39% of GPAs from 3.0 to 4.0.
 - (C) Seniors represent about 29% of the reported GPAs at Pearson High School.
 - (D) Only about 3% of seniors have GPAs *less than* 1.0.
 - (E) About 11% of the reported GPAs are juniors with GPAs from 2.0 to 3.0.
22. The coefficient of determination, r^2 , between two variables is computed to be 81%. Which of the following statements *must* be true?
- (A) Large values of the explanatory variable correspond with large values of the response variable.
 - (B) Large values of the explanatory variable correspond with small values of the response variable.
 - (C) A cause-and-effect relationship exists between the explanatory and response variables.
 - (D) There is a strong, positive, linear relationship between the explanatory and response variables.
 - (E) Approximately 81% of the variability in the response variable is explained by linear regression on the explanatory variable.

23. The carbohydrate content (in grams) for serving sizes of select dairy (D), fruit (F), meat (M), and vegetable (V) items is recorded, yielding the following graphical information.



- Which of the four food categories would have the smallest value for *all* measures of spread?
- (A) Dairy
 - (B) Fruit
 - (C) Meats
 - (D) Vegetables
 - (E) Meats with the outlier removed
24. The correlation between the depth (in feet) and length (in feet) for a sample of caves is found to be -0.346 . If the measurement of depth is converted to meters, what will be the resulting correlation? (1 ft = 0.3048 m)
- (A) -0.627
 - (B) -0.346
 - (C) -0.105
 - (D) 0.105
 - (E) 0.346

25. Data are collected from zoos for the age at death (in years) for black bears and grizzly bears. The graphs below model the data collected from these zoos.



Which conclusion can be drawn from this graph?

- (A) Grizzly bears tend to live longer than black bears, but their variability is smaller.
 - (B) Black bears tend to live longer than grizzly bears, but their variability is smaller.
 - (C) Grizzly bears tend to live longer than black bears, and their variability is larger.
 - (D) Black bears tend to live longer than grizzly bears, and their variability is larger.
 - (E) Grizzly bears tend to live longer than black bears, and the two variabilities are approximately equal.
26. In a very large school district, the food services administrator wishes to determine the proportion of students who will buy a school lunch to within ± 0.03 . Using the most conservative estimate for p , how many students should this administrator survey to have 90% confidence?
- (A) 164
 - (B) 271
 - (C) 457
 - (D) 752
 - (E) 1844

27. If two events, A and B , are mutually exclusive, then the probability that both A and B occur simultaneously is

- (A) 0.
- (B) 1.
- (C) $P(A) + P(B)$.
- (D) $P(A) + P(B) - P(A \cap B)$.
- (E) $P(A)P(B)$.

28. Which of the following is *not* a characteristic for t -distributions?

- (A) The t -distributions are mound-shaped.
- (B) The t -distributions are centered at 0.
- (C) The t -distributions have more area in the tails than a normal distribution.
- (D) The t -distributions use s as an estimate of σ .
- (E) As the number of degrees of freedom decreases, the t -distribution approaches the normal distribution.

29. Which of the following is a valid discrete probability distribution?

- (A)

x	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1
$P(x)$	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
- (B)

x	-2	1	2	4
$P(x)$	0.2	0.6	0.2	0.1
- (C)

x	1	2	3
$P(x)$	0.3	0.2	0.1
- (D)

x	1	2	3	4
$P(x)$	0.1	0.2	0.3	-0.1
- (E)

x	-2	-1	1	2
$P(x)$	-0.3	-0.2	0.2	0.3

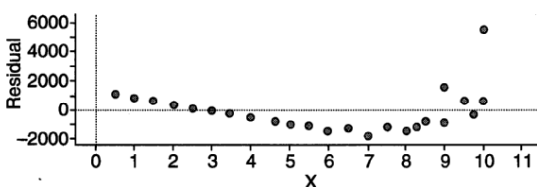
30. For a given school year, a reporter has been told that the average teacher's salary was \$59,500 with a standard deviation of \$17,200. The reporter also knows that teachers will be receiving raises of 3.25% for the next school year. What would the reporter write for the new average teacher's salary and standard deviation?
- (A) mean \$1934; standard deviation \$559
 - (B) mean \$59,500; standard deviation \$17,200
 - (C) mean \$59,500; standard deviation \$17,759
 - (D) mean \$61,434; standard deviation \$17,200
 - (E) mean \$61,434; standard deviation \$17,759
31. The average life expectancy for a male in eastern Africa is 45 years. Ten years ago, a major health organization opened a health clinic in a large village located in eastern Africa. The organizers believe the life expectancy for this village has increased as a result of the health care. What are the appropriate hypotheses for a significance test?
- (A) $H_0: \mu = 45; H_a: \mu \neq 45$
 - (B) $H_0: \mu = 45; H_a: \mu > 45$
 - (C) $H_0: \mu = 45; H_a: \mu < 45$
 - (D) $H_0: \mu \neq 45; H_a: \mu = 45$
 - (E) $H_0: \mu > 45; H_a: \mu = 45$
32. Since many individuals walk around their homes in their socks, a manufacturer has created a material for socks that is believed to be more resistant to wear than cotton. The manufacturer wishes to test this belief over a period of a month. Given a group of volunteers, which of the following designs will *best* test this new material's resistance to wear?
- (A) Have the volunteers wear the socks made from the new material for a month, and check the wear on the socks at the end of the month.
 - (B) Allow half of the volunteers to wear cotton socks, while the other half wear socks made of the new material. Compare the wear on the socks at the end of the month.
 - (C) Randomly assign half of the volunteers to wear cotton socks, while the other half wear socks made of the new material. Compare the wear on the socks at the end of the month.
 - (D) Randomly assign half of the volunteers to wear cotton socks, while the other half wear socks made of the new material. At the end of two weeks, the volunteers should change sock types. Compare the wear on the socks at the end of the month.
 - (E) For each volunteer, randomly choose which foot wears a cotton sock, while the other foot wears a sock made of the new material. Compare the wear on the socks at the end of the month.

33. Given the information below, which of the statements is true?

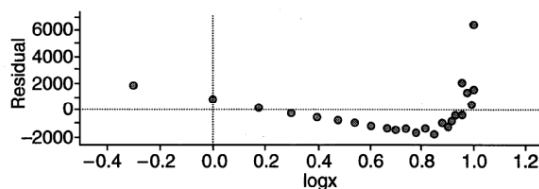
x	2	4	6	8	10
$P(x)$	0.3	0.2	0	0.4	0.1

- (A) The expected value of the random variable is 6.
- (B) The expected value of the random variable is 0.
- (C) The variance of the random variable is 1.
- (D) The expected value of the random variable is 11.6.
- (E) The variance of the random variable is 8.64.

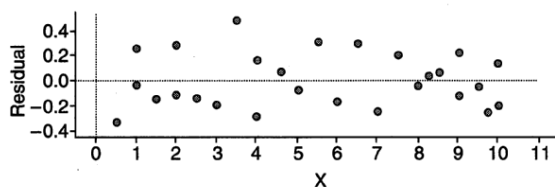
34. Residual plots and their corresponding linear regression equations are shown for a set of data. Using the equation with the best fit, find the predicted value of y when $x = 7$.



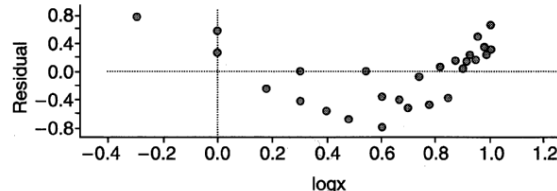
$$\hat{y} = 480x - 1400;$$



$$\hat{y} = 3310 \log x - 850;$$



$$\log \hat{y} = 0.387x - 0.051;$$



$$\log \hat{y} = 3.27 \log x + 0.011;$$

- (A) 454.988
- (B) 594.936
- (C) 1947.275
- (D) 1960.000
- (E) Not enough information is given to determine the predicted value for y .

35. A university is proposing a new procedure for professors to gain tenure. To gauge sentiment about the proposal, the university intends to randomly sample five professors, five assistant professors, five associate professors, five adjunct professors, and five visiting professors. This is an example of what type of sampling design?
- (A) Simple random sample
 - (B) Stratified random sample
 - (C) Systematic random sample
 - (D) Cluster sample
 - (E) Convenience sample
36. The weights of women are approximately normally distributed. This week, the z -score of weight for a member of a weight-watching group is 1.25. Which of the following is a correct interpretation of this z -score?
- (A) This week the member weighs 1.25 lb more than last week.
 - (B) This week the member weighs 1.25 lb less than last week.
 - (C) This week the member weighs 1.25 lb more than the average woman.
 - (D) This week the member weighs 1.25 standard deviations more than she did last week.
 - (E) This week the member weighs 1.25 standard deviations more than the average woman.

37. In a city, 13.5% of the labor force are members of a union. If a random sample of 75 adults is taken from this city, what is the probability that between 15% and 20% of them are union members?

(A)
$$P\left(\frac{0.15 - 0.135}{\sqrt{\frac{0.135(1 - 0.135)}{75}}} < z < \frac{0.20 - 0.135}{\sqrt{\frac{0.135(1 - 0.135)}{75}}}\right)$$

(B)
$$P\left(\frac{0.15 - 0.135}{\sqrt{\frac{0.15(1 - 0.15)}{75}}} < z < \frac{0.20 - 0.135}{\sqrt{\frac{0.15(1 - 0.15)}{75}}}\right)$$

(C)
$$P\left(\frac{0.15 - 0.135}{\sqrt{\frac{0.15(1 - 0.15)}{75}}} < z < \frac{0.20 - 0.135}{\sqrt{\frac{0.2(1 - 0.2)}{75}}}\right)$$

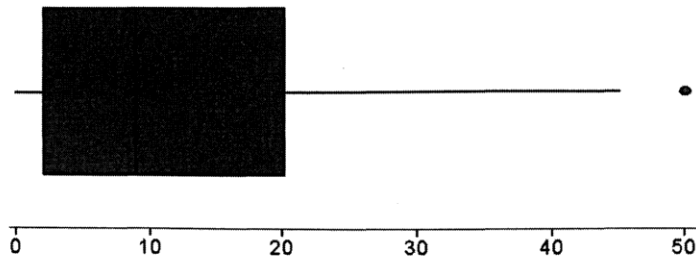
(D)
$$P\left(\frac{0.15 - 0.135}{\sqrt{\frac{0.2(1 - 0.2)}{75}}} < z < \frac{0.20 - 0.135}{\sqrt{\frac{0.2(1 - 0.2)}{75}}}\right)$$

(E)
$$P\left(\frac{0.135 - 0.15}{\sqrt{\frac{0.15(1 - 0.15)}{75}}} < z < \frac{0.135 - 0.2}{\sqrt{\frac{0.2(1 - 0.2)}{75}}}\right)$$

38. Having read about the positive effects of ginkgo biloba on memory, some precocious statistics students decide to conduct their own experiment to test the herb's effects. Close to 50 of their classmates, all in good health and representing a variety of ethnic groups, volunteer to take part in the experiment, and the students randomly assign half of the volunteers to take ginkgo. The other half take a placebo. The students perform a memory test on the volunteers at the beginning of the experiment and a second test eight weeks later. After analyzing their results, they find no memory improvement in the ginkgo group versus the placebo group. Assuming the students followed all aspects of good experimental design, which of the following can be concluded?

- (A) Ginkgo biloba does not improve memory, and no one should take it to improve memory.
- (B) Ginkgo biloba does not improve memory in healthy individuals and should only be taken by individuals exhibiting signs of dementia.
- (C) Ginkgo biloba does not improve memory in healthy teenagers and should only be taken by adults.
- (D) Ginkgo biloba does not improve memory in healthy teenagers and should only be taken by adults in poor health.
- (E) Ginkgo biloba does not improve memory in healthy teenagers, and further studies should be conducted to determine its effectiveness in other groups.

39. For the given boxplot, which are the correct summary statistics?



- (A)
- | Variable | N | Mean | Median | TrMean | StDev | SE Mean |
|----------|----|-------|--------|--------|-------|---------|
| Data Val | 47 | 12.23 | 9.00 | 11.16 | 12.16 | 1.77 |
-
- | Variable | Minimum | Maximum | Q1 | Q3 |
|----------|---------|---------|------|-------|
| Data Val | 0.00 | 50.00 | 2.00 | 20.00 |
- (B)
- | Variable | N | Mean | Median | TrMean | StDev | SE Mean |
|----------|----|-------|--------|--------|-------|---------|
| Data Val | 47 | 12.23 | 9.00 | 11.16 | 12.16 | 1.77 |
-
- | Variable | Minimum | Maximum | Q1 | Q3 |
|----------|---------|---------|------|-------|
| Data Val | 0.00 | 45.00 | 2.00 | 20.00 |
- (C)
- | Variable | N | Mean | Median | TrMean | StDev | SE Mean |
|----------|----|------|--------|--------|-------|---------|
| Data Val | 47 | 9.00 | 9.00 | 11.16 | 12.16 | 1.77 |
-
- | Variable | Minimum | Maximum | Q1 | Q3 |
|----------|---------|---------|------|-------|
| Data Val | 0.00 | 50.00 | 2.00 | 20.00 |
- (D)
- | Variable | N | Mean | Median | TrMean | StDev | SE Mean |
|----------|----|------|--------|--------|-------|---------|
| Data Val | 47 | 9.00 | 9.00 | 11.16 | 12.16 | 1.77 |
-
- | Variable | Minimum | Maximum | Q1 | Q3 |
|----------|---------|---------|------|-------|
| Data Val | 0.00 | 45.00 | 2.00 | 20.00 |
- (E)
- | Variable | N | Mean | Median | TrMean | StDev | SE Mean |
|----------|----|-------|--------|--------|-------|---------|
| Data Val | 47 | 12.23 | 20.00 | 11.16 | 12.16 | 1.77 |
-
- | Variable | Minimum | Maximum | Q1 | Q3 |
|----------|---------|---------|------|-------|
| Data Val | 0.00 | 50.00 | 9.00 | 45.00 |

40. Data have been collected, and a statistician conducts a test of significance using the data. The statistician is considering the effects associated with Type I and Type II errors under these circumstances. Which of the following is true?

- I. Reducing the probability of a Type I error increases power.
- II. Reducing power increases the probability of a Type II error.
- III. Reducing the probability of a Type I error increases the probability of a Type II error.

- (A) I only
- (B) II only
- (C) III only
- (D) I and II only
- (E) II and III only